

SYSTEM AND METHOD FOR IDENTIFYING AND PROCESSING AUDIO SIGNALS

CROSS REFERENCE TO RELATED APPLICATION

[0001] The present application is a continuation of U.S. patent application Ser. No. 15/810,673, filed Nov. 13, 2017 and entitled System and Method for Identifying and Processing Audio Signals, which is now U.S. Pat. No. 10,566,002 issued Feb. 18, 2020 (Attorney Docket No. W18), which is a divisional of U.S. patent application Ser. No. 13/450,739, filed Apr. 19, 2012 and entitled System and Method for Identifying and Processing Audio Signals, which is now U.S. Pat. No. 9,818,416 issued Nov. 14, 2017 (Attorney Docket No. J37), which is a Non-Provisional Application which claims the benefit of U.S. Provisional Patent Application Ser. No. 61/477,002, filed Apr. 19, 2011 and entitled System and Method for Identifying and Processing Audio Signals (Attorney Docket No. I77), and U.S. Provisional Patent Application Ser. No. 61/479,993, filed Apr. 28, 2011 and entitled System and Method for Identifying and Processing Audio Signals (Attorney Docket No. I81), each of which are hereby incorporated herein by reference in their entireties.

TECHNICAL FIELD

[0002] The present disclosure relates to audio signals and more particularly, to systems and methods for identifying and processing audio signals.

BACKGROUND

[0003] Hearing loss includes loss of the ability to distinguish between various phonemes. This includes difficulty with distinguishing consonants, for example, distinguishing “chicken” from “thicken”. Therefore, a method for identifying and distinguishing phonemes is desirable. Also, a method for distinguishing various signals, whether audio, mechanical, biological, seismic and/or ultrasound signals is desirable.

SUMMARY

[0004] In accordance with one aspect of the present invention, a method for phoneme identification is disclosed. The method includes receiving an audio signal from a speaker, performing initial processing comprising filtering the audio signal to remove audio features, the initial processing resulting in a modified audio signal, transmitting the modified audio signal to a phoneme identification method and a phoneme replacement method to further process the modified audio signal, and transmitting the modified audio signal to a speaker.

[0005] Some embodiments of this aspect of the invention may include one or more of the following. Wherein the phoneme identification method comprising analyzing the modified audio signal using a Hilbert-Huang transform method. Wherein the phoneme identification method comprising identifying a time slot occupied by a phoneme and identifying the phoneme in the modified audio signal. Wherein the method further includes transmitting the time slot and the identified phoneme to the phoneme replacement method. Wherein the phoneme replacement method includes determining whether the identified phoneme in the audio stream is a replaceable phoneme and, if the identified

phoneme in the audio stream is a replaceable phoneme, replacing the identified phoneme in the modified audio signal with a replacement signal. Wherein replacing the identified phoneme includes receiving the replacement signal from a table and determining a way to smoothly incorporate this sound into the modified audio signal. Wherein replacing the identified phoneme further comprising transmitting the modified audio signal to a speaker. Wherein filtering comprising digitally filtering the extreme values of the audio signal. Wherein the initial processing includes processing the signal and finding the maxima and minima of the signal, passing the maxima to a high-pass filter, filtering the maxima using a high pass filter to produce a filtered signal, sampling the filtered signal, applying an interpolation function to the sampled filtered signal to find the values between the last point and the current point, and determining the difference between the sampled filtered signal and the signal.

[0006] In accordance with one aspect of the present invention, a system for processing audio signals is disclosed. The system includes at least one speaker, at least one microphone, and at least one processor, wherein the processor processes audio signals received using a method for phoneme replacement.

[0007] Some embodiments of this aspect of the invention may include one or more of the following. Wherein the processor produces an audio stream. Wherein the processor receives an audio signal from the at least one speaker and performs initial processing. Wherein the processing comprising filtering to remove noise. Wherein processing includes filtering to remove audio features. Wherein the audio stream is processed by a phoneme identification method and a phoneme replacement method. Wherein the phoneme replacement method includes a learning method that includes monitoring the audio signal and the background noise and providing feedback to a broadcast method. Wherein the system further includes a classification method for enhancing the accuracy of phoneme identification. Wherein the phoneme replacement method includes a learning method including monitoring the audio signal and the background noise, and providing feedback to a broadcast method and wherein the broadcast method includes enhancing the audio signal and providing information to a classification method.

[0008] These aspects of the invention are not meant to be exclusive and other features, aspects, and advantages of the present invention will be readily apparent to those of ordinary skill in the art when read in conjunction with the appended claims and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] These and other features and advantages of the present invention will be better understood by reading the following detailed description, taken together with the drawings wherein:

[0010] FIG. 1 is a top-level breakdown of the replacement phoneme system according to one embodiment;

[0011] FIG. 2 is an illustrative chart of the division of the software;

[0012] FIG. 3 is an illustrative chart of one embodiment of the broadcast method;

[0013] FIG. 4 is an illustrative chart of one embodiment of the phoneme method;